MARINE REVIEW.

VOL. XIV. CLEVELAND, O., JULY 23, 1896. No. 4.

Ore Shipments—Discouraging Freight Outlook.

The association of Cleveland ore sales agents has received reports from dock managers at all upper lake ports, showing that on July 1 ore shipments aggregated 3,680,465 gross tons, against 3,142,751 tons on July 1, 1895, or an increase of 537,708 tons. These figures are in excess of the aggregate to July 1 in any previous year, notwithstanding the general depression in the iron industry and the great amount of ore that is being placed on dock instead of finding orders for direct movement to furnaces.

The situation is certainly discouraging in all its part. From one leading office, that of M. A. Hanna & Co., it is reported that five mines in the Lake Superior region have been entirely closed down recently, and at the Chapin, their biggest producer, forces have been cut 65 per cent. within the past two weeks. Ore men say that a great mistake would be made in reducing prices of ore, and that there is no probability of such a course being undertaken. They probably feel, however, that they would be better off now if the range of ore prices, as well as lake freights, had not been made quite as high as it was in the spring. But no good would come from reducing prices now. Action of this kind would only tend to disturb the entire iron market, and anyhow the furnace men and others who have bought high-priced ore must be considered, and they are most outspoken against a reduction. In the meantime docks are constantly becoming more crowded and there is no way of forcing furnace men to take the ore they have purchased. There has been some talk of vessel owners having large contracts being asked to allow a part of their contracts to run over until next year, but of course this will not be done unless present conditions continue for some time to come.

Tribute of Vessel Owners to Memory of Col. Pickands.

Again we are called together to mourn the loss of a prominent member of this association, Col. James Pickands.

Of the brave record of his military achievements others will gladly and proudly speak. It is for us to speak of him as a business associate and friend.

Clear sighted, progressive, modest and unobtrusive, but indomitable in will and purpose, James Pickands was of that class of men whose presence must be felt in any community. After an active and honorable mililary career, he established himself at Marquette and bore a prominent and most useful part in the commercial development and upbuilding of that section. Returning to his native state, Ohio, and to Cleveland, associated with his surviving partners, he soon was engaged in great enterprises, connected with the development of lake commerce, and in all that magnificent development he has been one of the foremost in planning and in executing, so that everywhere the impress of his genius is seen and felt in all that has made for development and real progress. Public spirited, high minded, the very soul of honor, he was an exceptionally generous man, so broad and catholic in his generosity that it extended beyond the giving largely, almost lavishly, of his means to every worthy cause and public need, to a tolerant respect for the honest opinions and convictions of other men, which made this modest, strong, courageous man respected of everyone who knew him and loved by those who knew him well; therefore be it

Resolved that we deplore the death of James Pickands as a great loss to the business community, a severe blow to his associates, and a most grievous affliction to his family and immediate friends, to whom we extend our sympathy; and

SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS—PRESIDENT AND VICE-PRESIDENTS.

Charles H. Cramp. George W. Quintard. Theo. D. Wilson. Philip Hichborn, U. S. N. Francis A. Walker. Clement A. Griscom. George W. Melville, U. S. N. Charles H. Loring, U. S. N. Wm. H. Webb. Irving M. Scott. Richard W. Meade, U. S. N.

Cargo and Speed Records—Lake Freight Ships.

It is quite certan that for the balance of the season there will be a steady improvement in the draft of water afforded ships in the Lake Superior trade and new cargo records will be made about every week. The Wolvin steamer Queen City now holds the Lake Superior record with a cargo of 4,108 gross or 4,601 net tons (actual weight), which she has just delivered at South Chicago, from Duluth.

Iron ore—Coralia, Mutual Transportation Co. of Cleveland, 4,738 gross or 5,307 net tons, Escanaba to Ashtabula, draft of 16 feet 1½ inches; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,569 tons gross or 5,117 net tons, Escanaba to South Chicago, draft of 18 feet. Lake Superior cargoes—Steamer Queen City, A. B. Wolvin of Duluth, 4,108 gross or 4,601 net tons, Duluth to South Chicago, draft of 14 feet 6 inches; steamer Sir Henry Bessemer, Bessemer Steamship Co. of Cleveland, 4,051 gross or 4,537 net tons, Ashland to Cleveland, draft of 14 feet 5 inches; schooner Aurania, John Corrigan of Cleveland, 4,074 gross or 4,563 net tons, Duluth to Ashtabula, draft of 14 feet 5 inches.

Grain—Steamer Queen City, A. B. Wolvin of Duluth, 151,000 bushels of wheat, Duluth to Buffalo, 14 feet 4 inches draft; steel schooner Martha, Minnesota Steamship Co., 165,000 bushels of corn, South Chicago to Erie on 15 feet draft; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 246,673 bushels of oats, Chicago to Buffalo.

Coal—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 45 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich., Buffalo to Duluth, 997 miles, 67 hours and 50 minutes, 14.7 miles an hour.

Readers of the REVIEW will remember the great value of engineering information that was collected in two large volumes, which were prepared, under the direction of George W. Melville, engineer-in-chief of the United States navy, after the meeting of the marine engineers and naval architects that was held in Chicago in connection with the World's Columbian Exposition. This collection of papers on marine and naval engineering and naval architecture makes up the most valuable work of its kind that has ever been put in print. The books were sold on subscription, but the New York publishers inform the REVIEW that they have a few left over, on which we can make a reduced price.

Engines of the St. Paul.

Since the American Line Steamer St. Paul recently broke the Atlantic record on the New York-Southampton voyage, averaging 20.82 knots an hour and making the run in 6 days, 5 hours and 32 minutes, it has been generally admitted that the United States can build vessels as good as any that float. It is also agreed that the Cramps will find no difficulty in building ships that will be as fast as the Lucania or Campania or the big flyers building in Germany if American capital is offered for such an undertaking. Since attention has again been directed to the American Line ships, on account of the speed which they have developed, some very good illustrations of their engines have appeared. The illustration presented herewith is from the Scientific American, which says:

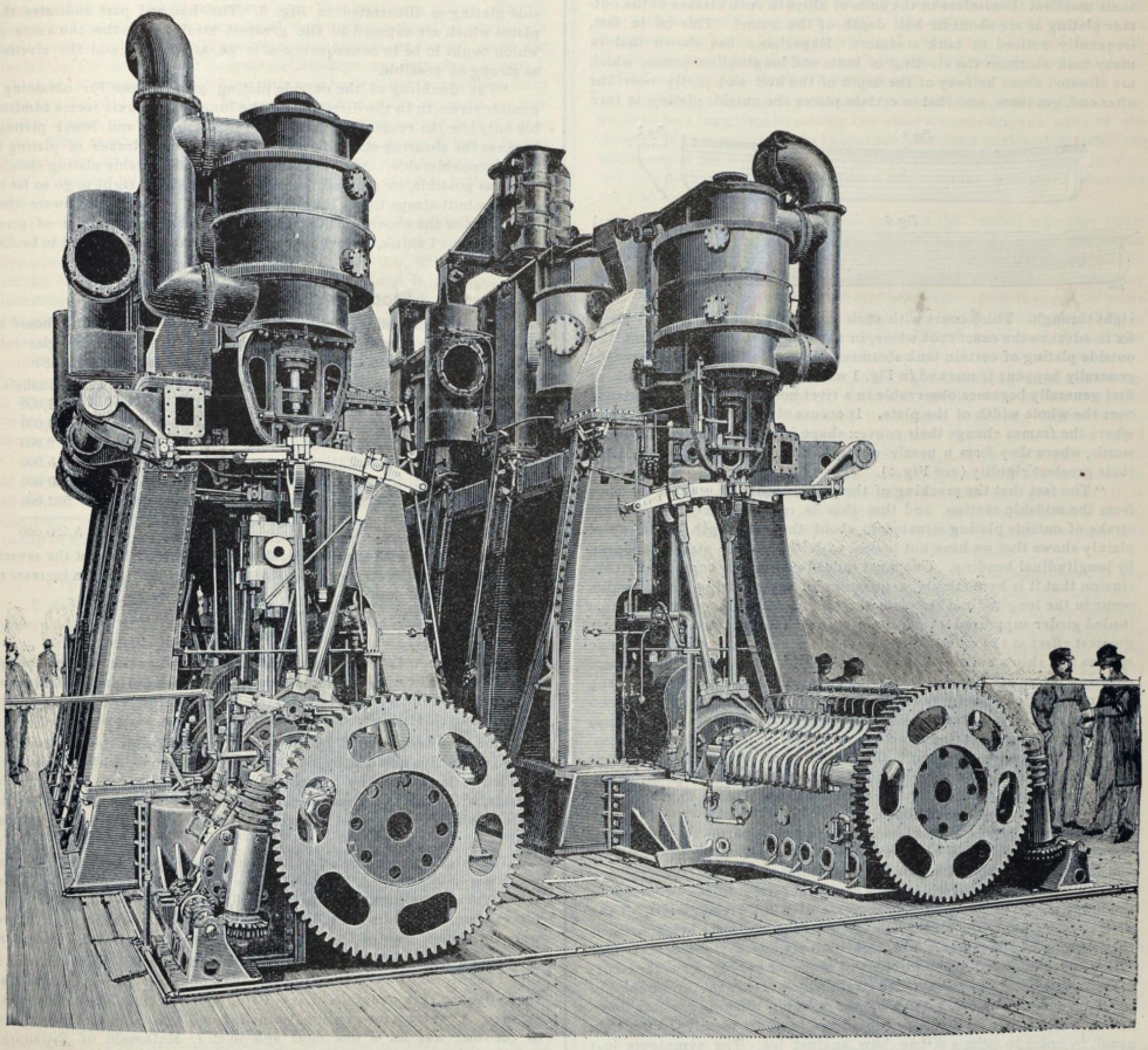
"The quadruple expansion engines of these ships are the largest on this system in the world, and they present many features of novelty in their design and construction. It is no light task that the engineer sets for himself, when he sits down at his draughting board to make provision for the creation of 20,000 horse power, within the contracted limits of space which are assigned to the engines and boilers of a modern Atlantic liner. Mr. Thom, consulting engineer of the American Line, who is responsible for the general design of these engines, has improved upon the common practice in large marine engines, by using a much higher pressure, (200 pounds to the square inch) by adopting quadruple in place of triple expansion engines, and by transmitting the 10,000 horse power of each engine to the shafting by means of four instead of the usual three separate cranks. These features in the engines of the St. Paul are directly in the line of development which marine machinery has been following since its earliest days, but they mark a long step in advance of anything yet attempted. The expansion of steam of the high initial tension of 200 pounds in six cylinders reduces the range of pressure in any one cylinder to a minimum, and thus gets rid of that most fruitful source of loss known as cylinder condensation. The distribution of the power among four cranks reduces the pressure upon the bearings, and keeps down the size of the low pressure cylindsrs. Of course, these advantages are in a measure offset by the fact that the number of surfaces in frictional contact, such as valves, valve gears, piston rings, etc., are multiplied, and the internal friction of the engine is theoretically increased; but the excellent working of those engines, which have now been twelve months in service, indicates that there is no difficulty experienced in actual practice.

"From the engraving, which shows them as they appeared in the erecting shops after their completion, it will be seen that they are in

AMERICAN ASSOCIATION OF MASTERS AND PILOTS OF STEAM VESSELS OF THE UNITED STATES.

CAPT. WM. S. DURKEE, Grand First Pilot.
LUTHER B. DOW, Grand Purser.
BENJ. F. PERKINS, Grand Captain's Clerk.
E. T. GRIFFIN, Captain Eureka Harbor, New London, Conn.
W. S. PHELPS, Captain Harbor 24, Saugatuck, Mich.
W. S. VANKENREN, Grand Captain.
CAPT. C. H. BRINKERHOFF, Captain Alpha Harbor, New York, N. Y.

duplicate, each set transmitting 10,000 horse power to its own screw propeller. The view is taken from the rear or thrust block end, the cylinder over the first crank being the second intermediate cylinder of 77 inches diameter. The view of the engines from the forward end gives a greater impression of height, as the pair of low pressure cylinders are surmounted by a pair of high pressure cylinders, which can be seen in the engraving to the rear of the right hand or starboard engine. The distribution of the six cylinders is as follows: On the first crank is a 77-inch low pressure cylinder, surmounted by a 28½-inch high pressure cylinder; on the second crank are low and high pressure cylinders, duplicates of the first; on the the third crank is a first intermediate, 55 inches in diameter; and on the fourth a crank is a second intermediate,



TWIN QUADRUPLE EXPANSION ENGINES OF THE ST. LOUIS AND ST. PAUL.
Expansion in two high pressure, two intermediate, and two low pressure cylinders. Maximum horse power, 20,000.

77 inches in diameter. The expansion is as follows: Steam at 200 pounds is admitted to the two 28½-inch cylinders; from them it passes to 55-inch intermediate; then to a 77-inch intermediate, and finally to two 77-inch low pressure cylinders. All the cylinders have a 60 inch stroke.

"The condensers have three-quarter inch brass tubes, and are 7 feet 2 inches diameter, and provide a total surface of 26,000 square feet. The air pumps and circulating pumps are of the Worthington type, the same firm providing the feed heater and feed pumps. The feed enters at 210 degrees. The condensers and pumps are not connected to the main engines, as in the Paris and New York, but are located separately in the wings of the ship. Balanced piston valves and Cramps metalic packing are used. This latter consists of cast iron rings compressed by a coil spring. The starting and reversing is effected by means of a separate engine. The crank shaft is 21 inches in diameter and hollow, and the propeller shaft is 19 inches in diameter and is made solid.

"There are ten boilers in all, six double-ended and four single-ended. They are all 15 feet 7½ inches in diameter, and are respectively 20 feet and 10 feet long, the plating being $\frac{9}{16}$ inch thick. They are fitted with Fox's corrugated flues and 2¾ inch tubes. An interesting feature is the fitting of the tubes with 'retarders,' which cause the gasses to follow a spiral path in the tubes, and so remain longer in contact with their surface. The total grate area and heating surface for all the boilers are respectively 1,144 and 40,300 square feet. They are worked under the Howden system of forced draught. In addition to the main engines, there are, of course, numerous auxiliary engines, such as those for driving the electric light dynamos and the ventilating and refrigerating plants, not to mention steam capstans, steam windlasses, steam steerers and other devices that make up the equipment of a modern steamship.

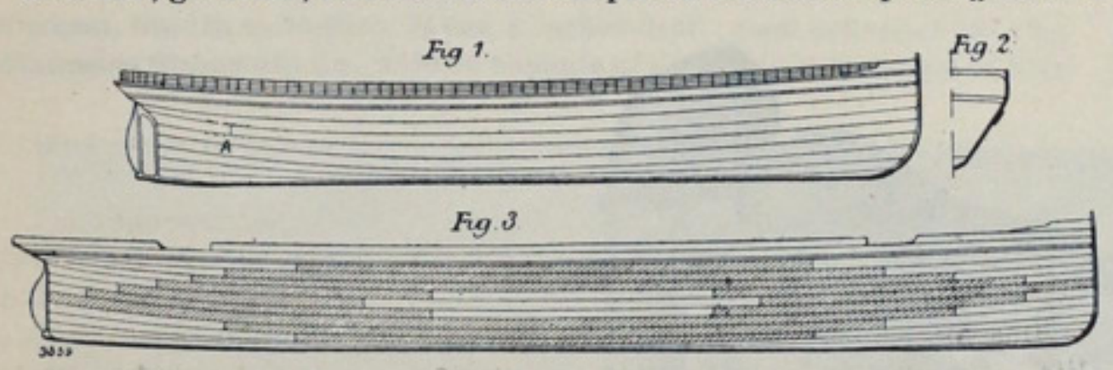
"The fact that the record-breaking trip of the St. Paul was made on a consumption of 310 tons of coal per day shows that these vessels are very economical on fuel."

Through tickets are sold by the Nickel Plate road at from one to three dollars lower than other lines. Solid through service between Chicago, Buffalo, New York City and Boston. 202-July 31

Weakness in Ships Exposed to Heavy Strains.

One of the several papers read at the recent meeting of the Institution of Naval Architects in Germany was prepared by Herr Otto Schlick, and as it dealt with signs of weakness in ships exposed to heavy strains it may prove especially interesting to lake ship builders. Mr. Schlick said:

"It is generally known that signs of weakness in steamers mainly appear near the midship section, and it is generally only here that loose rivets in the butts of sheerstrake and upperdeck stringer plates, or even cracked plates appear, and this perfectly agrees with the theory of strength. It must, therefore, naturally surprise us if analogous symptoms manifest themselves in the ends of ships in such strakes of the outside plating as are about in half depth of the vessel. This is, in fact, frequently noticed in tank steamers. Experience has shown that in many tank steamers the riveting of butts and longitudinal seams, which are situated about halfway of the depth of the hull and pretty near the after end, get loose, and that in certain places the outside plating is torn



right through. This occurs with such regularity that it is possible to fix in advance the exact spot where, in the course of several years, the outside plating of certain tank steamers will tear. The place where this generally happens is marked in Fig. 1 with the letter A. The crack at first generally becomes observable in a rivet hole, and very soon extends over the whole width of the plate. It occurs always exactly in the place where the frames change their convex shape into the concave; in other words, where they form a nearly straight line, and consequently have their greatest rigidity (see Fig. 2).

"The fact that the cracking of the plates occurs at a great distance from the midship section, and that this is regularly the case in that strake of outside plating situated at about the half depth of the ship, plainly shows that we have not to deal with the tensile strain produced by longitudinal bending. One must indeed necessarily come to the conclusion that it is here simply a question of the shearing forces which occur in the longitudinal seams of the plating. It is notorious that in a loaded girder supported at both ends the shearing forces have their greatest effect at the extremities and in the neutral axis; nearly the same applies to a ship's hull. There is only this difference, that the maximum shearing forces are not at the extreme ends, but that they take effect at a larger or smaller distance from the ends, according to the distribution of weight in the longitudinal direction, and to the fineness of the lines, but the maximum shearing strain always exists at the level of the neutral axis. In wooden vessels it is the wrinkling of copper sheathing that shows the effects of the shearing forces; in iron or steel ships the symptoms of weakness produced by the same cause are nearly unknown, except in the cases mentioned above.

"In the cases which have come under my observation the strakes of the outside plating were of an exceptionally great width (over 5 feet), and it is to be assumed that this has something to do with the cracking of the plates; for, as theory teaches us, the shearing forces occuring in the longitudinal seams gradually increase with the greater width of the plates. Very likely the strong vibration in tank steamers helps towards the cracking of the plates. The fact that similar symptoms have not hitherto been noticed in the forepart of ships (or only to a small extent) is explained, partly by the smaller strain which occurs in the forepart of the ship, and, on the other hand, by the greater thickness of the bow-plates, which latter, in the cases considered here, are mostly thicker than usual, in order to form a strong bow against ice. The symptoms just named in every way confirm theory, and we can conclude therefrom that it is not always permissible to leave the effect of the shearing forces entirely out of consideration, as has been generally done up till now. Indeed, I believe that, in view of the continuous increase of the dimensions of ships, we must not, in future, neglect to give our attention to this point.

"The conclusions to be drawn from these observations with regard to the construction of ships exposed to heavy strains are the following: In the first instance, it will be useful to have the treble riveting of the butts which are situated in half the vessel's depth extended more towards the ends of the ship. Formerly double riveting was considered of sufficient strength. The extension of treble-riveted butts towards the ends will be particularly required in every case where exceptionally wide plates are used. The classification societies generally prescribe a stronger riveting of the butts whenever the breadth of the plates surpasses a certain limit. It is evident, however, that in doing so the prevalent intention was to avoid the diminution of the strength at the middle of the ship arising from the use of broader plates. Whenever, in a ship, saving of weight is one of the most important points in the design, only single riveting for the longitudinal seams and double riveting of the butts of those strakes situated at the half depth should be permitted, but only for a certain distance in the middle of her length. But at the ends the riveting of the longitudinal seams should always double and treble in the butts. We further learn from these observations that it does not appear practicable to reduce the thickness of the strakes which are at half the height of the ship towards the ends. If looked upon from a merely theoretical point of view, it is advisable to arrange the thickness of the outside plating as illustrated in Fig. 3. The hatched part indicates the plates which are exposed to the greatest strain, and the thickness of which ought to be in consequeuce as large as possible, and the riveting as strong as possible.

"The doubling of the outside plating as a means for obtaining a greater strength in the direction of the longitudinal axis seems admissible only (for the reasons already given) in the upper and lower plating, because the shearing strain between two adjoining strakes of plating is here inconsiderable. At the ship's ends doubled outside plating should, as far as possible, be avoided, unless it is considered right to go so far as to apply butt-straps to the longitudinal seams. I am quite aware that the object of the above considerations is neither unknown nor of great importance. I think, however, it will be of sufficient interest to be discussed here."

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes on July 18, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago	13,591,000	4,958,000
Duluth	7,208,000	3,000
Milwaukee	399,000	2,000
Detroit	113,000	5,000
Toledo	425,000	30,000
Buffalo	1,046,000	592,000
Total	22,782,000	5,590,000

As compared with a week ago, the above figures show at the several points named a decrease of 14,000 bushels of wheat and an increase of 204,000 bushels of corn.

In General.

Canada's new Liberal premier, Hon. Wilfred Laurier, has completed his cabinet. The minister of marine and fisheries is Hon. L. H. Davies; minister of public works, Hon. J. Israel Tarte; minister of railways and canals, Hon. J. H. Blair.

Bids have been invited by the British admiralty for the construction of two of the five new battleships for the English navy which it has been decided to have built by private contract. They are to be 14,000-ton vessels, with armor of a maximum thickness of 6 inches and Belleville boilers, which are expected to develop 12,500 horse power under natural draft.

The largest check drawn on the sub-treasury in San Francisco for years was paid last week for work on the battleship Oregon to the Union Iron Works. It amounted to $678,000, and the proceeds in $20 gold pieces were taken from the sub-treasury to the Bank of California. There were thirty-four bags of the coin, which together weighed 2,500 pounds.

The Carnegie railway (Butler & Pittsburgh), which is to provide a direct connection into Pittsburgh for the Conneaut ore road, known as the Pittsburg, Shenango & Lake Erie, will be completed early next spring. A contract for grading, tunneling and masonary on thirty miles of the road was let a few days ago to C. I. McDonald of Pittsburg. Tunnels are to be suited to double tracks, as it is thought it will be necessary to double-track the entire road later on.

Letters bearing the following names await claimants at the marine post office, Detroit: Wm. Anderson, Capt. W. H. Buzzard, Moses Bruyore, John Burns, Fred D. Cameron, W. A. Curtis, Henry Campbell, Alex C. Callam, David Davis, John Gibbons, Howard Hawkins, Joseph Hope, F. G. Hutchins, Chas. Keller, Oscar Lindberg, Hugh McCollum, John W. McClure, Mrs. Geo. McCauley, Grafton McDonald, James McKinley, John K. McPherson, Walter Mahon, Henry Mattison, Master Arthur Mahon, William Newcomb, Charles Nellet, Owen Niguet, John Pudvan, Capt. H. H. Parsons, James Oatman, Dorous Palmer, J. E. Sheehan, Jim W. Stevens, Frank Smith, A. C. Smith, Harry Sutton, Jennie Stevens, W. L. Shackett, Capt. H. H. Townsend, George A Underwood, Bruce Walker, Capt. Str. James Pecans.

Ship Yard Matters.

A Detroit correspondent says: "For several days past the steamers Merida and Senator have been side by side at the foot of Orleans street and both will very probably get away before Monday next. The work of rebuilding the Merida's engines, or practically putting new engines into her, has been rapidly done. The time is less than fifty days. Both the Frontier works and S. F. Hodge & Co. are entitled to credit for this rapid work. On Saturday steam was first gotten up on the Senator and everything was found satisfactory. With the engines working at ninety-five revolutions, there was no perceptable vibration in any part of the ship. Manager Humphreys and Engineer Carter are greatly pleased with their vessel, and the work on her generally is really worthy of commendation. Her steering gear will attract attention. The engine is placed directly forward of quadrant, on the same level, and works so close that slack chain is altogether avoided. At Wyandotte preparations are being made for launching the first of the two Rockefeller ships on Saturday, August 1. These big steamers will each have only two boilers but they will be fitted with the Howden hot draft. Boilers for the first of the steamers are now at the Orleans street works, and they are attracting a great deal of attention. They are the largest ever built in this city, being 14 feet 6 inches diameter and 12 feet long, with three furnrces and no less than 439 tubes. Shell plates are 1¼ inches thick and the weight of each boiler is fifty tons."

Four more of the Rockefeller ships will be in commission within three weeks to a month. The John Ericsson and her consort at West Superior are well along toward completion, and the William Siemens, second of the ships at the Globe yard, Cleveland, is about ready for launching. One of the steamers at the works of the dry dock company, Detroit, the William Fairburn, is also being hurried.

Capt. McDougall, manager of the American Steel Barge Co., has prepared plans for a whaleback steamer a few feet longer than the John Ericsson, recently launched by the barge company for Mr. Rockefeller. It is expected that directors of the barge company will, at a meeting to be held in New York during the latter part of this month, authorize the construction of this steamer on their own account.

The fire boat which Rieboldt, Wolters & Co. are to build for the city of Milwaukee is to be of wood, with steel sheathing, 107 feet over all, 24 feet beam and 11 feet depth of hold. Engines will be built by the Charles F. Elmes Engineering Works of Chicago. Pumps will have a capacity of 6,000 gallons a minute.

Pig Iron—Dull Market and Heavy Production.

Unfavorable conditions in the iron and steel industries, which prompted a big decline in lake freights, are still as pronounced as they were when the depression set in. The production of pig is decreasing gradually but stocks continue to increase. Production during the first half of 1896 has not, of course, been so heavy as it was during the last half of 1895. A statement just issued by the American Iron & Steel Association shows that the total production of pig iron of all kinds in the United States in the first half of 1896 was 4,976,236 gross tons, an increase of 888,678 tons over the corresponding period of last year and a decrease of 382,514 from the second half of 1895. The production of pig iron of Bessemer quality in the first half of 1896 was 2,793,672 gross tons, against 2,402,023 tons in the first half of 1895 and 3,221,622 tons in the second half. The whole number of furnaces in blast June 30 was 196, against 242 in blast on Dec. 31 last. On June 30 the stocks unsold in the hands of manufacturers or their agents, not intended for their own consumption, amounted to 644,887 gross tons, against 444,332 tons Dec. 31, an increase of 200,555 tons, or over 45 per cent.

The steamer Queen City's big cargo of corn, 202,000 bushels, loaded at Chicago Wednesday, is equal to 5,656 net tons, or 349 tons more freight than has ever been carried by a lake vessel. The Coralia's big ore cargo from Escanaba to Ashtabula amounted to 5,307 net tons. The Queen City's average draft with this cargo, 16 feet 6 inches, is, however, 4½ inches more than the draft on which the Coralia moved 5,307 tons. Having taken 4,601 net tons from Lake Superior and 5,656 net tons from Lake Michigan, the Queen City now holds records for both lakes.

Owners of the Wilson Line of sea-going steamers are adopting the Babcock & Wilson boiler for their vessels rapidly. Three vessels of the Wilson fleet are fitted with Babcock-Wilcox boilers—the Hero, Nero and Cameo—and there soon will be a fourth, the Orlando, a vessel the same size as the Cameo and Hero. Two other English ship-owning firms have also contracts for this type of boiler, after having had experience of their every-day working over a number of voyages. Messrs. Cook & Son, the well known tourist agents, are adopting the Babcock-Wilcox marine boilers, and will shortly have two vessels, the Mahomet Ali and Rameses, their largest passenger steamer, equipped with them.—The Engineer, New York.

Around the Lakes.

The middle ground in the St. Mary's river, just below the lock, opposite Spry's dock, has recently been removed to a depth of 20 feet. Buoys formerly marking this shoal have been removed.

Logs from Canadian forests have been crossing Lake Huron to Saginaw bay ports at the rate of about 40,000,000 feet per month, and indications are that this pace will continue until the close of navigation.

It was reported some time ago that a shoal existed in Presque Isle bay (Erie harbor), about 100 yards E ½ S of can buoy No. 2, but upon a careful examination of the locality by a naval officer no evidence of shoaling was found.

Few, if any, new hands will be employed at Sault Ste Marie when the new lock is opened early next month. The entire force of employes on the present lock will be transferred to the new one. The old lock will not be operated when the new one is in use, but will be kept in good order for immediate service in emergency.

A Chicago dispatch reports Capt. James Reid as saying that he expects to be a long time in raising the steel steamer Cayuga, sunk in the Straits. As yet only two steel pontoons have been sunk and attached to cables under the wreck. In all, eighteen steel cables, 8 inches in size, will be attached to the wreck before a lift is made. The steel pontoons are said to be a success.

Capt. George McKay, who was lost with the lumber schooner Little Wissahickon, which foundered on Lake Erie a few days ago, was about fifty-five years of age. He was a son of Capt. William McKay, a pilot in Helmsdale, Southerlandshire, Scotland, and had followed sailing all his life. He came to America thirty-five years ago. For twenty-two years he resided with his family in Bay City. He was in the employ of H. A. Ballentine & Co, who formerly owned the Wheeler ship yard, for thirteen years, and was generally considered a careful and competent man.

The hydrographic office sends out the following information regarding shoals in Blind bay, St. Lawrence river: "All shoals abreast of Blind bay, as shown on the chart, have been removed. There is still another shoal not shown on the chart, situate just a little above Blind bay, but as there was only about one cubic yard above the required depth (19 feet), it was not touched. The John Pridgeon shoal was removed in 1892 to a depth of 18 feet, but as the water has lowered a great deal, it is at the present statement, above grade. We understand it will be removed under the present appropriation. There was also removed this year the shoal between Whaleback and Bay State shoals."

Capt. John C. Hea of Chicago, whose death was announced a few days ago, was a typical sailor of the era now gone, when the lake commerce was done in schooners, and was a great favorite with the veterans of that time. His last command was the schooner Parana, in which he owned an interest, and when she passed out of his hands and the hands of those interested with him he retired from active seafaring life. This was in 1874 or 1875. Ever since then he had been connected in some capacity with one and another of the tug lines at Chicago, the last fourteen years of his life as night superintendent for the Chicago Towing Co. Capt. Hea was well known along the entire chain of lakes and had many friends in Milwaukee.—Milwaukee Evening Wisconsin.

A fixed white lantern light has been established on each of the two structures recently erected on the southern prolongation of the axis of the dredged channel from Portage lake into the head of Portage river, Keweenaw peninsula. The front light is shown 18 feet above mean lake level, suspended from a bracket on a mast in front of a small lamp house on a square crib, in about 6 feet of water, on the east bank of the channel. The mast carries an oval day mark of slats. The entire structure, excepting the crib, is white. The rear light is shown, 25 feet above mean lake level, suspended from a bracket on a mast in front of a small lamp house on the easterly bank of the river, 600 feet south by east from the front light. The mast carries an oval day mark of slats. The entire structure is white.

Thirty-six half-tone engravings, 6 by 8 inches, well printed, and all made up from good photographs of vessels of the United States navy, are contained in a neat pamphlet, just issued by the International Engraving and Illustrating Co. of Philadelphia.

The list of American and Canadian vessels, with length and beam, and name and address of managing owner, is up to date, and correct in the Blue Book of American Shipping. Send $5 for it to the MARINE REVIEW, Cleveland.

One fare to Salt Lake City plus $2.00 via the Nickel Plate road, Aug. 5th and 6th, account the International Fire Engineers convention.
201-July 31

The rate to Boston via the Nickel Plate road is lower than via other lines. Through sleepers and diners at your service, too. 199-July 31.

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, O by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

The books of the United States treasury department on June 30, 1895, contained the names of 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598.72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged	487	83,081.91
Total	3,342	1,241,459.14

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Gross Tonnage.
Year ending June 30, 1891	204	111,856.45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
Total	747	335,433 98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895.*	1894.	1893.	1895.	1894.	1893.
No. vessel pass'ges	17,956	14,491	12,008	3,434	3,352	3,341
T'n'ge, net registd	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of Navigat'n	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about ½ per cent. of the whole, but largely in American vessels.

NOT LONG ago the British admiralty decided to exclude from colleges under their control, and from dock yards engaged on government work, naval cadets who were sent from the United States to England and Scotland to complete their training in ship building lines. Now it has been decided that courtesies which were extended by the naval authorities in Washington to naval attaches of foreign countries will be considerably curtailed, and it is no longer possible for these men to witness armor experiments or torpedo work. Until last year, at every great armor test naval attaches were present, and had every chance to report on results which had been obtained through great expense and trouble. They not only saw the effect produced on the best armor-plates made in the world by the best ordnance, but were also in a position where secrets could be gathered which the authorities here never in the world could have learned abroad. Now all this has been stopped, and it has only been done because of the growing feeling that foreign governments were learning more about our naval development than was safe for this country, without giving adequate return for the same.

THE suggestion from Col. G. J. Lydecker, that the new lock at Sault Ste. Marie be named after the late Gen. O. M. Poe, meets with favor among vessel owners everywhere, and a recommendation from the Lake Carriers' Association to that effect will undoubtedly be approved by the war department. The committee of the association to whom was referred, at the last annual meeting, the question of providing a fund for a Poe memorial of some kind at the Sault seems to have been somewhat negligent. Nothing has been heard of an effort of any kind made by the committee since the Detroit meetiug. This matter must now be taken up by the executive committee of the association, or it will be allowed to pass by default. Col. G. J. Lydecker, who is now in full charge of the works which Gen. Poe had carried almost to completion, says that the new lock will certainly be open to navigation early next month. If the Lake Carriers' Association is to take any part in dedicating the new lock, either next month or upon its completion entirely in the spring, it would seem about time to begin preparations for the ceremony.

AT THIS time a year ago there was no evidence of the boom in freights that followed later on. Of course, conditions were then far more favorable to higher freights than they are now. Ore shipments were not 500,000 tons ahead of all previous years as they are at present. But after all the high freights of last fall were due mainly to a heavy grain movement, and there is still some hope of grain shipments bringing about some change next month in the present depressed freight market. The ore rate from the head of Lake Superior last season remained at 85 cents until August 24. After that date the advances were marked and rapid. But there was a change of only 5 cents throughout the months of June, July and August.

IT IS NOT probable, after all, that there will be any general change in members of the army engineer corps on the lakes. Since the appointment of Col. G. J. Lydecker to succeed the late General Poe in charge of the big works at the Sault and in the connecting rivers of the lakes, it has been announced that Captain Curtis McD. Townsend, who has been connected with the Mississippi river commission, has been ordered to proceed to Grand Rapids and relieve Col. Lydecker of certain river and harbor works on the east shore of Lake Michigan. This order makes provisions permanently for all lake stations.

NOT only in Cleveland, but in Detroit, Marquette and several other lake cities commercial bodies hastened, immediately after the announcement of the death of Col. James Pickands, to give expression to their sorrow and to speak in the highest terms of his upright business career. In Cleveland resolutions were adopted by the Lake Carriers' Association, Western Iron Ore Association, Chamber of Commerce, Western Reserve National Bank and associations of war veterans.

Electricity in Ship Building.

The application of electro-motors for the driving of machinery in ship yards and engine works promises to extend rapidly, thus providing an additional factor in the acceleration of the already rapid rate of production in these branches of industry. They have already been adopted to some extent in several of the largest Clyde yards and engine shops, and in one or two on the North-East coast of England. The rapidity of the work which has been done recently on several British battleships has been remarkable, and has been mainly due to the employment of electrically-worked drills, slotting machines, and other apparatus of a kindred nature. The application of electricity, however, has not in England assumed anything like the dimensions observable in German workshops and ship yards. At the Berlin Machine Works, for example, the tools and machines employed, which are of the latest patterns, are worked by electro-motors, which receive power from a central station. In the ship and engine works of Messrs. Blohm & Voss, Hamburg, which have been mostly rebuilt and reorganized within the past few years, there are electrically-driven hoists alongside the building berths, electric (combined with hydraulic) power travelling cranes throughout the engine and boiler shops, and clever applications of the principle to various other machine tools. At the present time preparatons are going forward for the laying down of a new ship yard at Nikolaiev, Russia, the machinery for which is to be almost entirely electrically driven, and is being made in Germany, Belgium and France.

Snip Building During the Past Year.

Although the annual report of the United States commissioner of navigation for the fiscal year ended on the 30th of last month will not be in print until November or December, a few advance summaries of the statistical part of the report have been given out. These summaries show that during the year nearly three-fourths of the new steel tonnage in the entire country was build on the lakes. The tonnage of steel vessels built in all parts of the country during the year ended June 30, 1896, was 106,900 gross tons, against 47,700 tons during the year ended June 30, 1895. On the lakes there was built during the year 104 vessels of all kinds, aggregating 92,000 tons, compared with ninety-two vessels of 38,000 tons for the previous year, which indicates also the rapid increase in the size of vessels of the lake fleet. The number of vessels of all kinds built throughout the United States during the year was 709 and the tonnage was 204,000 tons, compared with 682 vessels of 133,000 tons during the previous year, or an increase of 71,000 tons. Steam vessels built numbered 322 of 135,000 tons, compared with 283, of 75,700 tons for the previous year.

In a large number of cases the Blue Book of American Shipping has been sent on approval to ship owners, ship builders, marine engineers and others interested in shipping. In every case the price of the book, which is $5, has been remitted immediately.

One fare rates to Omaha via the Nickel Plate road Aug. 17th and 18th, account the Y P. C. U. of the U. P. church. 204-July 31

Relative Strength of Navies.

The British Naval Annual for 1896, a work authoritative on matters pertaining to navies of the world, places the United States fourth among naval powers. The order is Great Britain, France, Russia, United States, Germany and Italy. The editor of this work claims that the relative strength of the various naval forces is best measured by naval expenditures and he estimates the expenditures for 1895-96 as follows: Great Britain, $93,500,000; France, $54,000,000; Russia, $30,500,000; United States, $25,350,000; Germany, $21,500,000.

This work also gives comparative tables of the effective fighting ships built and building. In the accompanying table no gunboats nor ships of a speed less than 15 knots are counted. Cruisers above 5,000 tons displacement are put in the first class, and those between 2,000 and 5,000 tons in the second and third classes. Lookout ships are generally under 2,000 tons, but have a good speed. In the coast defense ships of the United States, the thirteen old type monitors, mounting ancient smooth bore guns and in a generally dilapidated condition, are not counted.

A Quick Repair Job.

We have occasionally made mention of instances of rapid work in the execution of ship repairs, but we have seldom had opportunity to note instances of the kind in the case of damaged machinery. On Tuesday of last week the whaleback steamer Thos. Wilson cracked her high pressure cylinder when coming out of Erie, completely disabling that engine. Her agents immediately placed themselves in communication with S. F. Hodge & Co., Detroit, the builders of the engines, with the result that the Wilson was immediately placed in tow of the steamer Marina and taken to Detroit. She arrived at Hodge & Co'.s dock at about 5:30 p. m. on Wednesday. Men were immediately put to work to strip the high pressure cylinder and to remove some of the side plates of the engine room turret, to permit of the cylinder being taken out, and the main steam pipe and throttle valve were suspended and braced, thus leaving them undisturbed. After the cylinder had been removed (it was the middle of the three) a copper pipe was fitted to connect the throttle valve to the receiver of the intermediate engine, thus making an ordinary two-stage compound; all pipes and connections were replaced, and at 4 p. m. on Thursday, just 23½ hours after reaching the dock, the engines were again turning; and at 5 o'clock the steamer was ready to proceed on her way. She will run in this manner until the new high pressure cylinder, which Hodge & Co. are making for her, is ready. Any engineer, and especially those familiar with this type of steamer, will realize that this is work of the very quickest kind and reflects the highest credit on those who carried it out.

A French Submarine Boat.

A French inventor, M. Goubet, has been for several years working on designs for a submarine boat, which, according to foreign journals, seems at last to have been put in practical form. Between 1889 and 1891 a submarine boat of his invention underwent a lengthy series of trials at Cherbourg, but was unfavorably reported on by the French authorities. Since that time, it is claimed, M. Goubet has modified the features to which objection was taken, and his new boat, "Goubet II," has proved so far a success that several foreign governments are said to have given orders for these vessels. The boat is described as follows: The vessel is spindle shaped, the hull being made of broad rings of bronze bolted together; its length is 26 feet 3 inches, and its diameter at the largest part 5 feet 8 inches. The keel is somewhat like a fin in shape, and there are also fin like strips on the side. The single screw projects from the stern, and is so made as also to answer the purpose of a rudder. The motive power is electricity. Oars project from the hull and are intended to serve as subsidiary means of locomotion in time of need. The vessel is submerged by admitting water into the hull, and the whole submersion device is controlled automatically. A manometer is provided, and this being set for a particular depth keeps the vessel at that depth even when her buoyancy is suddenly altered (accidentally or otherwise). Due provision is made for maintaining the stability of the boat. When she rises to the surface a device is ready to enable the captain, to look about and see the condition of affairs. In addition to the captain, the craft is intended to carry two men. Fresh air is chemically supplied. Automobile torpedoes are to be carried, and they can be started from within.

Advantages of Five-Crank Engines.

Thomas Mudd, well known marine engineer, has an interesting article in Cassier's Magazine on the five-crank engines of the steamer Inchmona, built recently by Wm. Gray & Co. of West Hartlepool, England. He says:

"Five cranks offer, in many ways, decided advantages over four cranks, and it would seem that if three cranks be abandoned, the step should be to the next odd number, five. To move to five cranks is an advantageous step in a great number of ways relating to the mechanism. In the case of the Inchmona there are two low-pressure cylinders of equal diameter, and, therefore, not greatly larger than the No. 3 cylinder. This results in three important things: First, the centers of the engines, while being suitable for interchangeability of crank shafts throughout, are much closer together than they could have been with one large low-pressure cylinder; in the second place, the reciprocating weights are very greatly reduced, and, in the third place, these reciprocating weights can all very easily be made equal to each other.

"To have very light reciprocating parts, to have equal weights in the reciprocating parts on each crank pin, to have reversals of the up- and down effects of these equal reciprocating weights following each other with only one-fourteenth to one-sixteenth part of a second between, all this means not only to have a very smooth-running engine, but to have an engine practically incapable of setting up vibration in a large ship. At 100 revolutions per minute these engines run with the greatest possible smoothness, and at that speed there are 1,000 impulses per minute, or something like sixteen per second, alternating between an upward and a downward impulse. The division of the total power into five units, giving each crank pin only one-fifth of the total work, is a step in the right direction, reducing initial stresses on bearings, and the distribution of the power at five equal points of attachment around the crank circle results in an exceedingly uniform turning moment, which is so advantageous to the speed of the ship by the production of regular speed of propeller. In large engines the limit of power is determined, on the one hand, by the size the low-pressure cylinder can conveniently be cast, and, on the other, by the number of revolutions per minute at which it is safe to run with the actual weights of reciprocating parts necessary, assuming the boiler pressure to be constant."

	England.			France.			Russia.			United States.			Germany.			Italy.			Japan.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battle ships:																					
First class	21	8	29	10	8	18	5	6	11	2	4	6	4	1	5	8	2	10	4	....	4
Second class	12	.....	12	11	.....	11	5	2	7	.....	.....	.....	7	....	7	2	....	2	....	1	1
Third class	11	.....	11	2	.....	2	.....	.....	.....	2	.....	2	3	....	3	5	....	5	....	....	....
Total battle ships	44	8	52	23	8	31	10	8	18	4	4	8	14	1	15	15	2	17	4	1	5
Coast defense ships	13	.....	13	16	.....	16	10	4	14	6	.....	6	17	2	19	...	....	....	2	....	2
Cruisers:																					
Armored	16	.....	16	9	1	10	9	1	10	2	.....	2	....	1	1	1	4	5	2	....	2
First class	11	6	17	2	4	6	2	.....	2	3	.....	3	1	....	1	....	....	....	....	....	....
Second and third class	51	15	66	10	9	19	3	1	4	10	.....	10	3	4	7	16	1	17	10	....	10
Look out ships	19	.....	19	12	.....	12	.....	.....	.....	10	.....	10	11	1	12	....	....	....	4	....	4
Torpedo gunboats	34	.....	34	12	3	15	8	.....	.....	....	.....	.....	9	1	10	15	2	17	....	3	3

EFFECTIVE FIGHTING SHIPS BUILT AND BUILDING.

John J. S. Williams of New Orleans, one of the leading members of the national organization of marine engineers, says of the Blue Book of American shipping published by the REVIEW: "Let me congratulate you on the great work you have accomplished. It must have cost a great deal to execute such a work, and it is my sincere wish that it will fully repay you, so that you may be encouraged to extend your labors and have the book take in more fully, next year, both the Atlantic and Pacific coasts."

Instructions for Use of Howden Draft.

Now that some forty steam vessels on the lakes, of various kinds, and most of them of the largest type, are fitted with the Howden system of hot draft, the management of the Dry Dock Engine Works of Detroit, controlling patents on this draft, has issued instructions to engineers, with a view to getting the very best results from the appliances. This system of draft is, of course, very simple, and officials of the dry dock company say that there is no difficulty whatever in having engineers and firemen understand its main principles, but they realize that the great demand for economy in fuel from this time on is going to require care in every detail of cost connected with making steam, and they want to bring out the full advantages of the draft. They have accordingly issued the following instructions:

FIRE BARS AND FURNACES.

1. The side bars must be fitted close to the sides of the furnace so as to prevent air from passing up at the sides. Fire clay should always be kept in the recess made for the purpose. The dead plates must also be air tight at the sides.

2. Care must be taken to have all the fire bars fitted so as to have no slackness sideways when working.

3. Thin bars should be used to pack the bars sideways should the last bar of the ordinary thickness to be put in be too thick for the space. The proper allowance for expansion of the bars under heat must be allowed for lengthways.

4. No air whatever must be allowed to pass through the bridge from the ashpit. Air must pass from the ashpit through the fire grate only.

If the tubes are clean when starting, the boilers may run with the retarders continuously for a fortnight (if the fires are properly worked) before requiring to be cleaned by the steam jet.

FIRING.

The highest evaporative power combined with the highest economy will be obtained with the least labor by carefully attending to the following directions:

1. In firing, the coal must be maintained nearly level across the furnace, and always a good height at the bridge.

2. The coal must not be heaped up in front, as is usual in natural draught boilers, or lie against the cast-iron boxes inside the furnace fronts. When the fire is too high in front, the air from the cast-iron boxes at the sides of the furnace, and from the box on inside of the furnace door, is prevented from striking over the level of the fuel and effecting its proper combustion. Heaping coal up near the furnace door also destroys the air boxes, and consequently causes the admission of too much air to the furnace without increasing the combustion. All unnecessary use of air in the furnace wastes fuel. The air boxes at the sides of the furnaces and on the inside of the furnace doors should keep in order for a year if the firing is properly done.

3. The fires should never be so thin as to allow air to pass up too freely through the fuel, nor should the fires be too thick to prevent the ignition of the fuel all through. When thick fires are used, they should be opened up by the slice shortly after firing.

4. As the coal burns more quickly at the sides and the back, care must be taken to lay the coal well in at the sides in firing, and to push it back when leveling before firing.

5. Fresh coals should not be thrown on the fires before the fires are levelled with the light rake. The rake should be used to level the fires after they are well burned and a short time before firing. When this is regularly done the surface of the fires will always be easily kept in good order.

Note.—Heavy smoke with distillation of gas and production of soot, causing deposits of tar and soot on the back tube plates and in the tubes, and which sometimes also causes flaming in the uptake and funnel, is entirely due to the coal being allowed to lie in a dead mass without a sufficient quantity of air being passed through it.

CLEANING FIRES.

1. All fires must be cleaned from the top and never pricked from below. Pricker blades should not be allowed on board. When the light is not seen shining through the bars from the window in asphit door, the fire is either too thick, and requires to be opened up from above by the poker, or clinker has formed on the firebars, preventing the passage of air through the coals. The heavy slice must then be used and the sharp chisel end made to pass over the top of the firebars and lift up the clinker from them. The window on asphit door shows when the fires require the poker or slice. So long as the light shines through the firebars into the asphit no poker or slice is required in the furnace. Examination through the window will generally show the part of the grate where the combustion is most retarded.

WORKING AIR VALVES.

1. The top air valve should not be shut when firing or even in cleaning fires. It should be set by the engineer to suit the kind of coals being used when starting, and never moved during the voyage unless to prevent steam blowing off when the engines are stopped.

2. Before opening the furnace door for firing, the asphit valves must be shut. and opened again whenever the door is shut. When steam is rising faster than is wanted, shut one asphit valve, and if that is not sufficient, shut both valves. Should steam still rise, shut the upper valve also.

3. When working natural draught shut both asphit valves, open asphit door, and keep the upper valve full open. Never open the furnace or smokebox doors to keep down steam, as the combustion is perfectly controlled by the air valves. Be careful when working to have the furnace and asphit doors perfectly closed.

WORKING A NUMBER OF BOILERS TOGETHER.

To maintain a constant and full supply of steam when working a number of boilers together, each fireman should work the furnaces under his care as if there were no others in the ship.

As each fireman will use different quantities of coal and will give the fires different treatment, a number of men firing merely by rotation will always bring the fires into an irregular and unfavorable condition.

Likewise, the cleaning of fires should not be left merely to be done at a given hour. Some coals very soon run a clinker over the bars and prevent combustion from below, which will reduce the effect of the furnace from one-half to two-thirds. Whenever the mica windows (which should always be kept clean) do not show the light shining in the asphit, the slice must be used to lift the clinker from the bars. It is not always necessary to remove all the clinker. If it is turned on edge it will not hinder combustion, and it can be removed at convenience. The frequent use of the slice to clear the firebars from clinker, and partial cleaning of fires whenever required, will always keep the fires in the the best condition and make the thorough cleaning of the fires at the usual intervals a much lighter operation, which should occupy only a few minutes' time.

Cleaning fires with this forced draught should in no case cause any drop in steam pressure. Though one fire in each boiler was being cleaned simultaneously, the steam pressure should be fully maintained. This is easily accomplished by the simple rule that no fireman begins to clean a fire until the other fires under his care are put in good condition, with a proper charge of coal on each and full air pressure below bars. Following this course in some steamers with single boilers, having three furnaces only, the engines are maintained at full speed, and the safety valves made to blow off while cleaning fires. An equal effort should be aimed at also in high-powered steamers with many boilers. Treatment of fires, whether in firing, slicing, dressing, or cleaning, should be done rapidly. Far too much time is generally taken sorting fires. Suitable tools for each fireman should always be lying at his hand, so as to prevent loss of time in completing his operations. Following these instructions, every fire should always be in good order and steam plentiful.

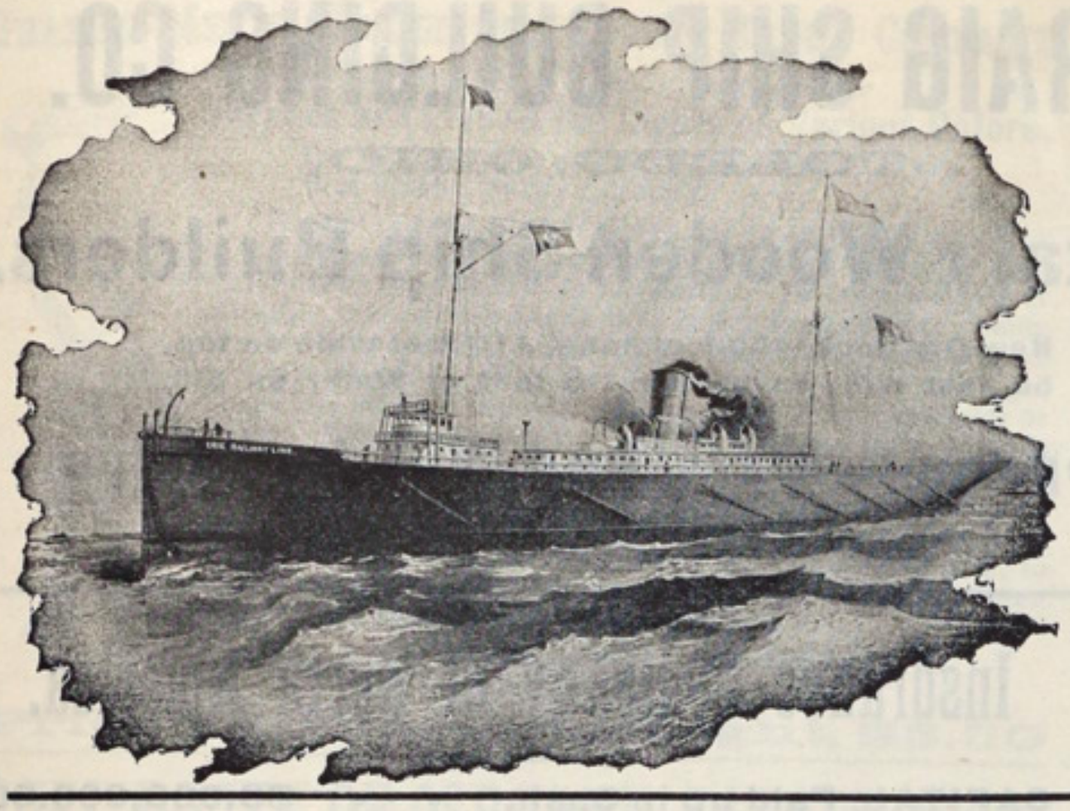
A Deposit of Asbestos.

A large body of short fiber asbestos was discovered some time ago in White county, Ga. The asbestos rock in this body is about 350 feet wide, 950 feet long, and as far as known, 60 feet deep. The material in this rock is not adapted for textile fabrics but is especially valuable for paper pulps, cement and for bricks for lining furnaces, heaters and grates. The bricks can be cut directy from the rock. For other purposes the rock needs only to be milled, no separation being necessary, on account of its almost absolute purity. The analysis of the rock shows about 50 per cent silica and 30 per cent. magnesia. The deposit is owned by the Sall Mountain Asbestos Co. of Saute, White county, Ga. The company manufactures the asbestos into lagging for locomotives, coverings for boilers and steam pipes, insulating materials for refrigerators and cold storage cars, coaches and sleeping cars and material for deafening floors. It is also made into material for fire proofing and insulating partitions. The sales agency of the Sall Mountain Asbestos Co. is in the hands of Bruner, Sprague & Co., 1027 Manhatten building, Chicago. Further information regarding the asbestos can be obtained from the sales agency.

On July 25 the Penberthy Injector Co. of Detroit will celebrate the event of the manufacture and sale of 100,000 Penberthy injectors during a period of ten years, extending from June 5, 1886, to May 12, 1896. An excursion will be given on the Detroit and St. Clair rivers. Friends and customers of the company, as well as employes, are being invited to join in the festivities.

The Blue Book of American Shipping answers questions that arise daily in every vessel agent or owner's office. If the book is not satisfactory it costs nothing, as the $5 will be returned. Order at once, No. 409 Perry-Payne building, Cleveland.

The I. O. O. F. excursion rates to Buffalo via Nickel Plate road will be a fare and a third. Tickets are on sale Aug. 4, 5 and 6. 203-July 31



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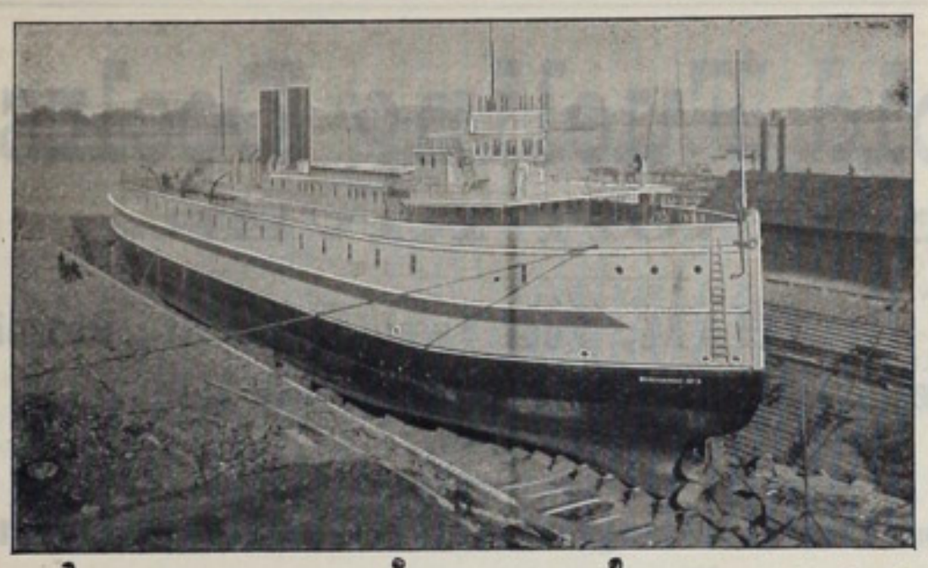
The onlv Water-tube Boiler in the British Merchant Marine	**15,500 "**



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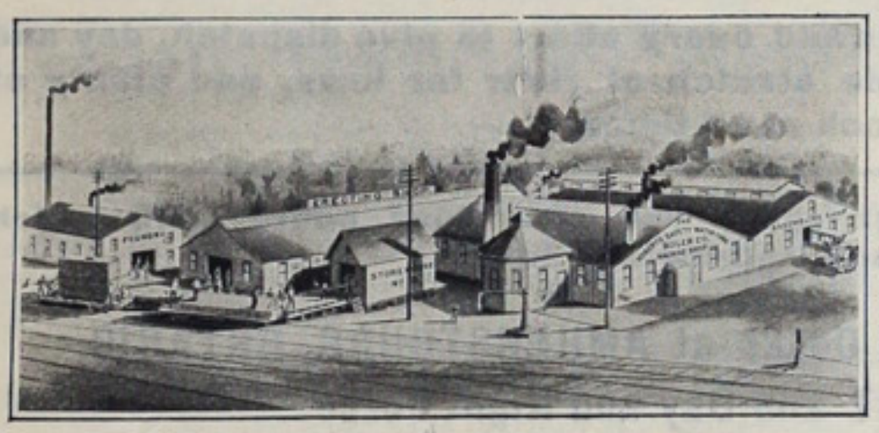
Metal and Wooden Ship Builders.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships A Specialty.



Chicago, Jan. 13, 1896.

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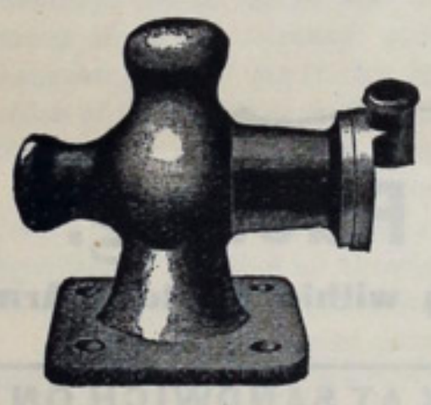
WORKS, RED BANK, N. J. 39 & 41 Cortlandt St., NEW YORK.

PROPOSALS FOR IMPROVING ERIE HARBOR, Pa., U. S. Engineer office, D. S. Morgan Building, Buffalo, N. Y., June 19, 1896. Sealed proposals for dredging, and furnishing and placing rip-rap stone at Erie Harbor, Pa., will be received here until 11 o'clock A. M., July 20, 1896, and then publicly opened. Information furnished on application. T. W. SYMONS, Major, Engrs. July 18.

Enos Combined Bitt, Winch and Sheet Holder.



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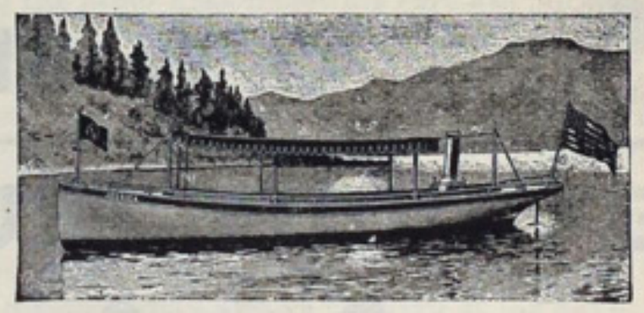

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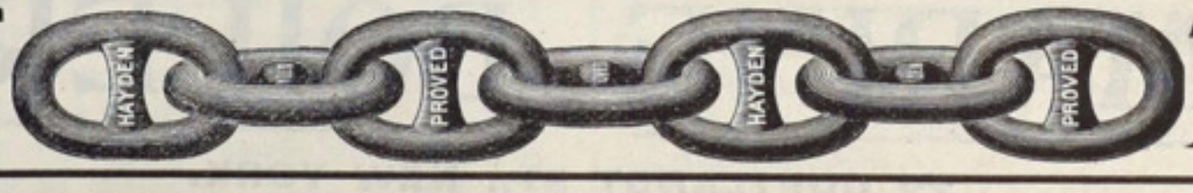

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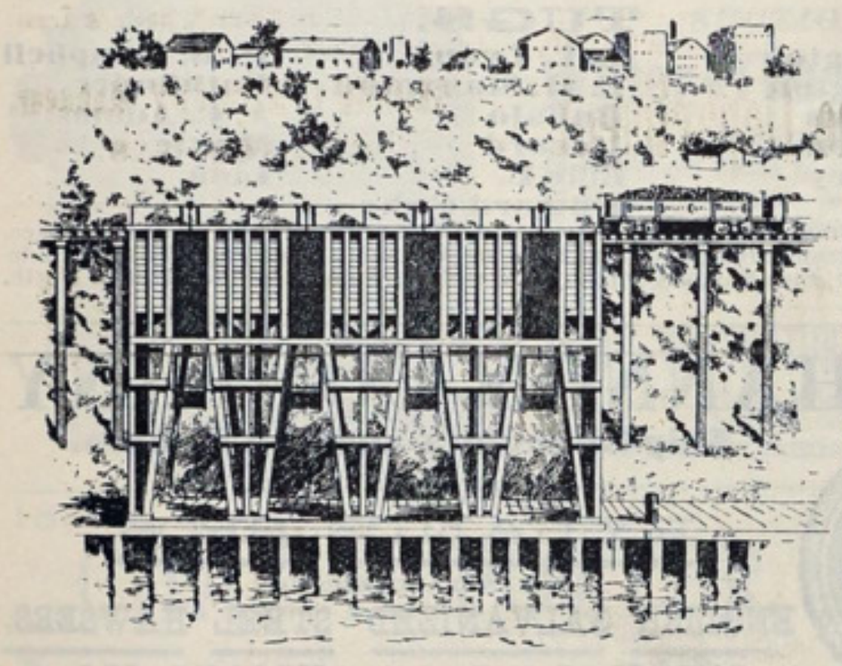

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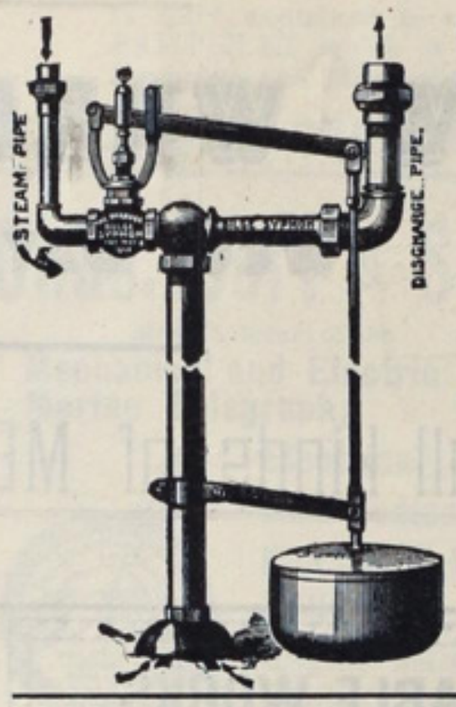

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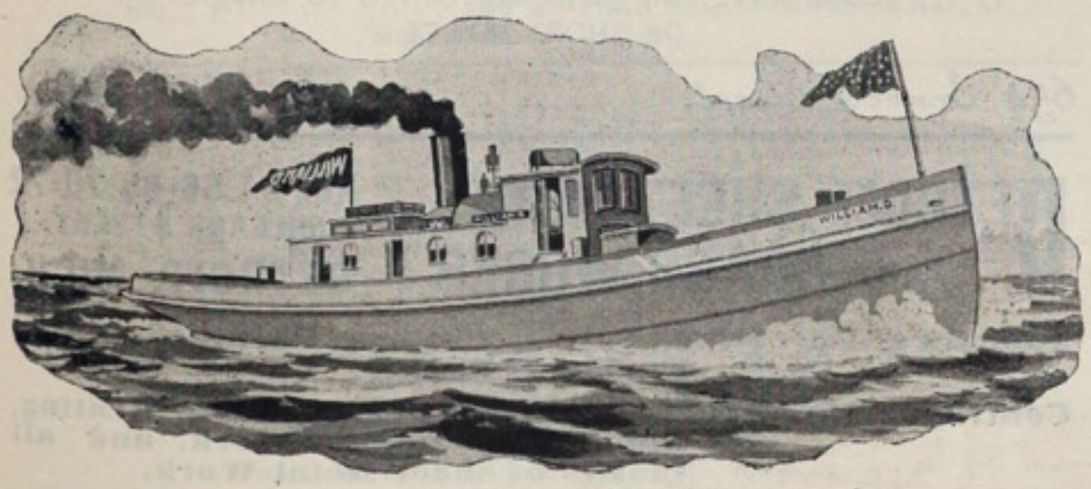

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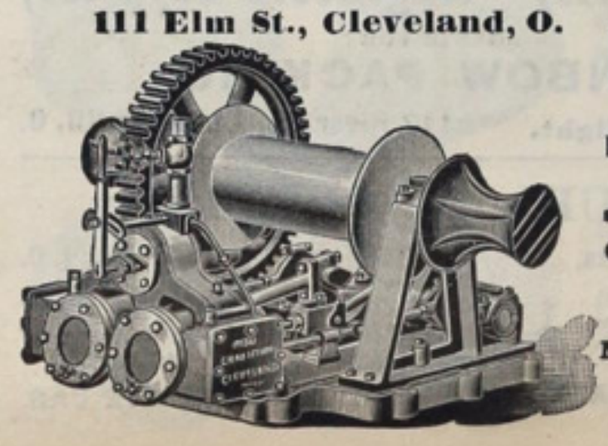

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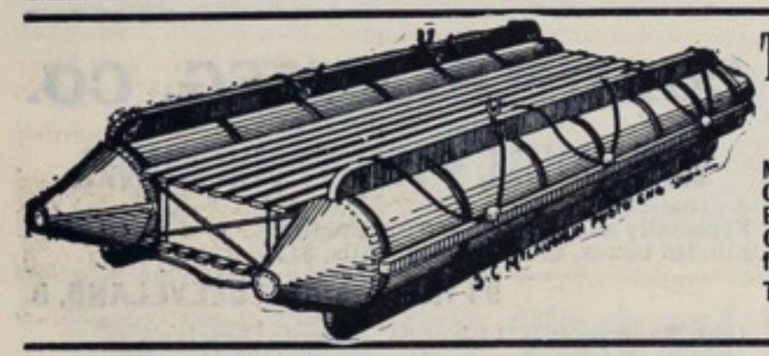

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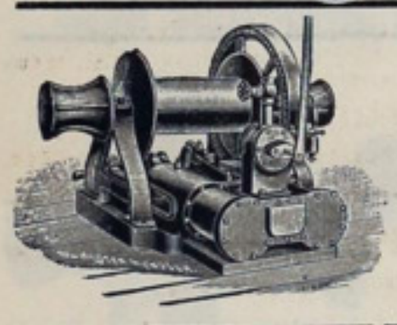

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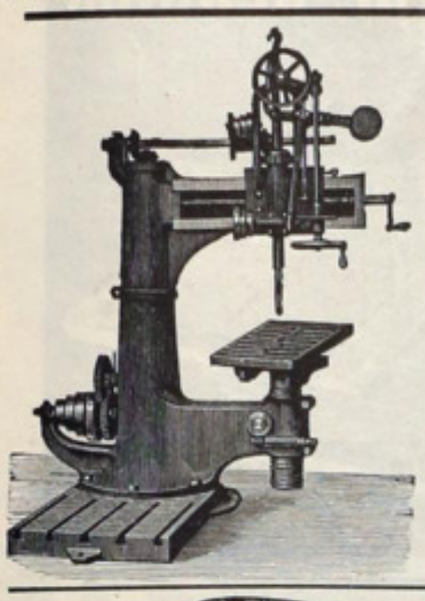

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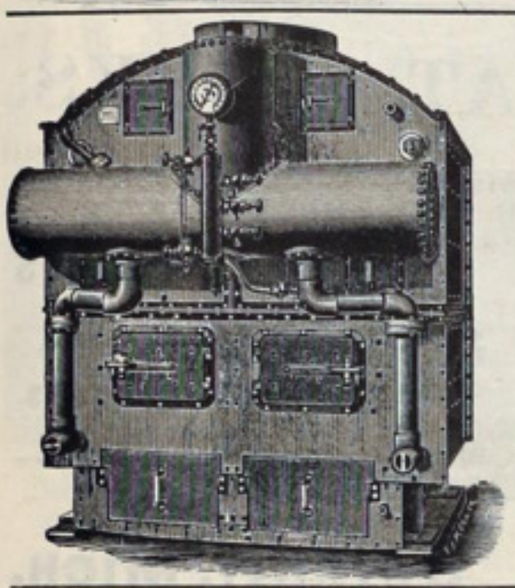

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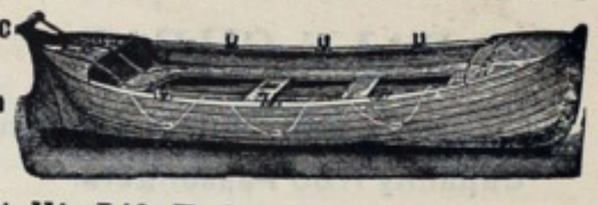

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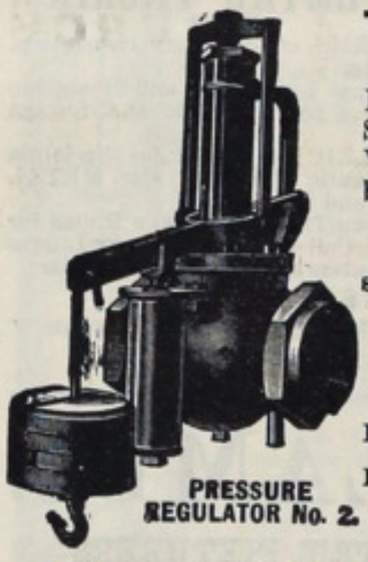

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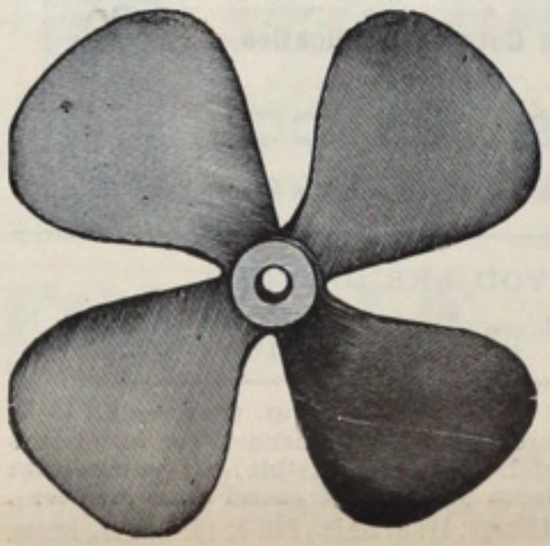

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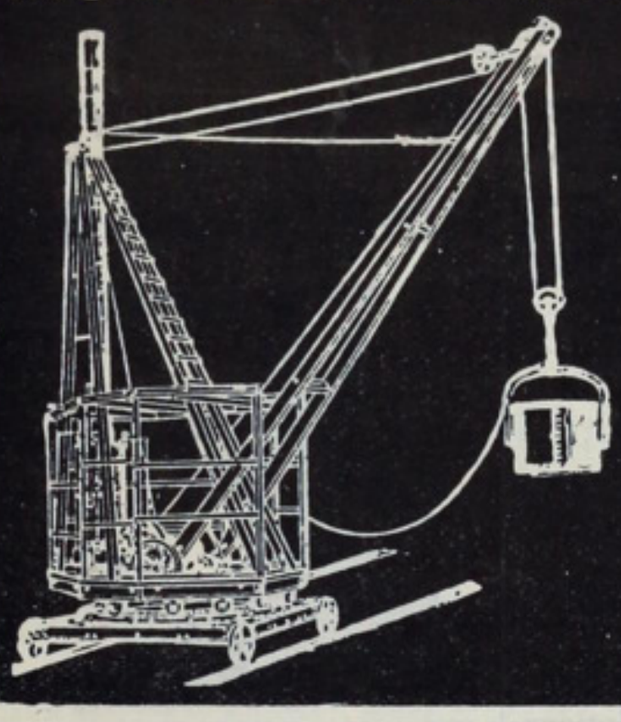

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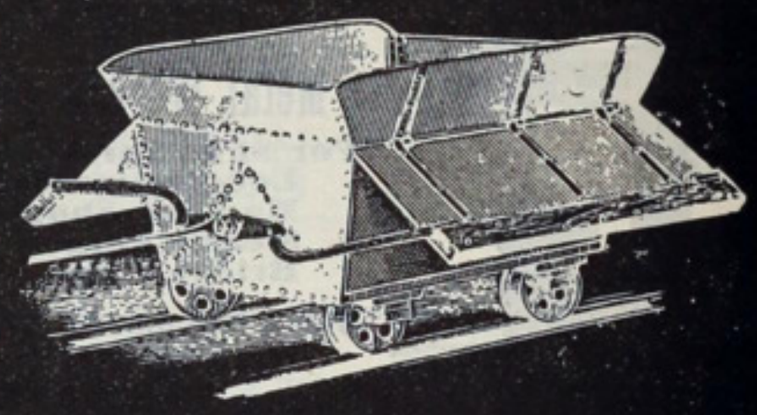

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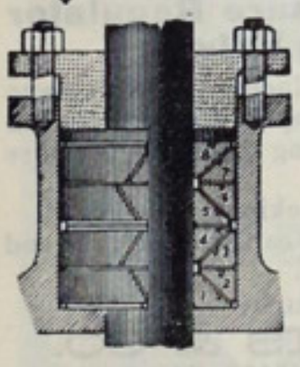

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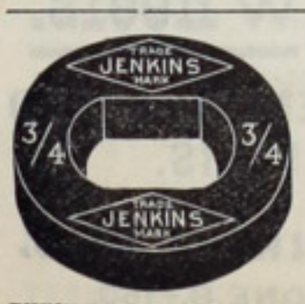

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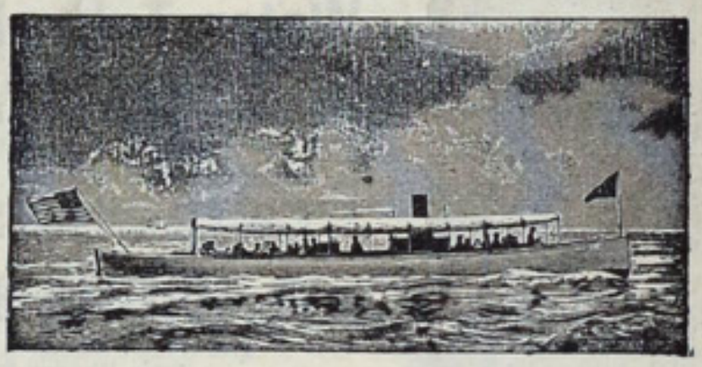

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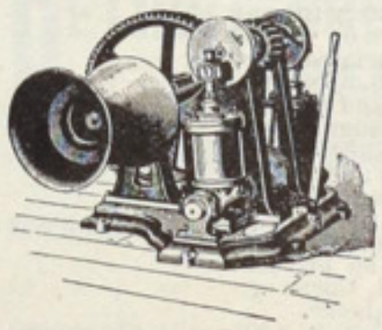

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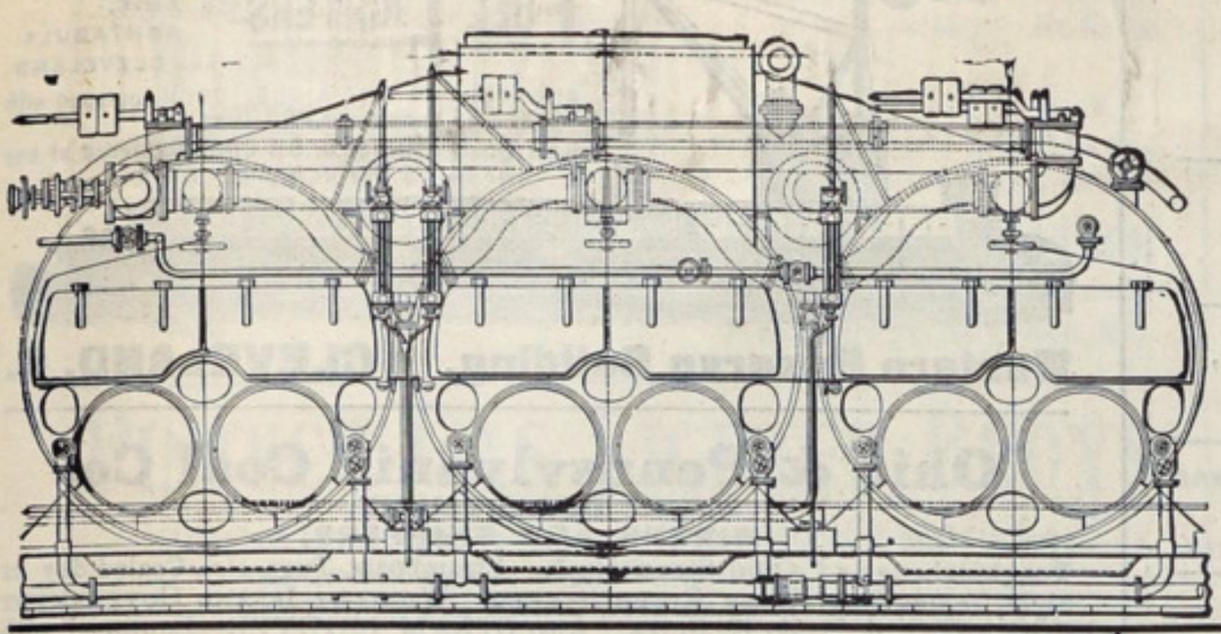

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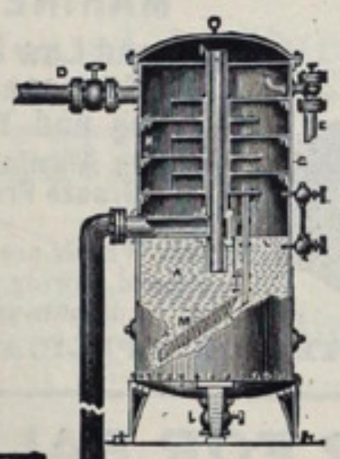

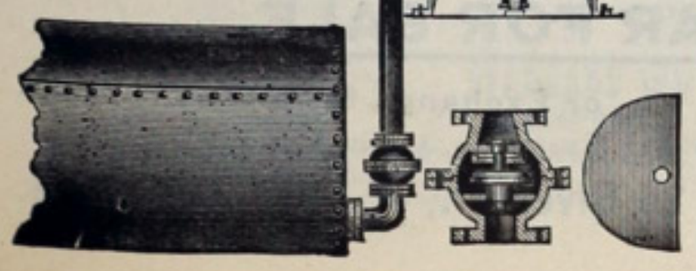

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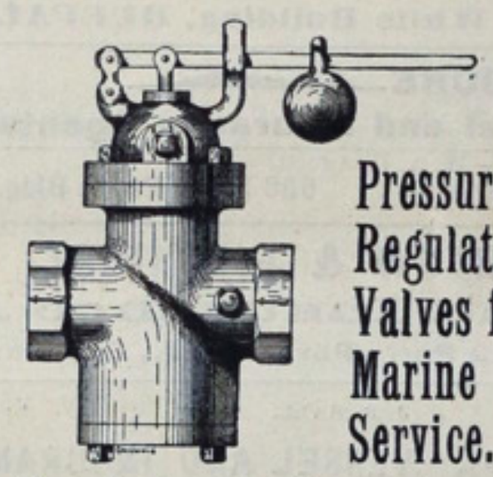

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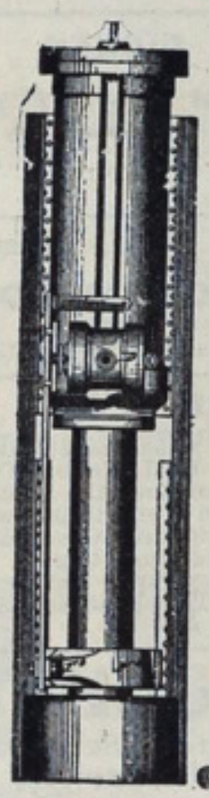

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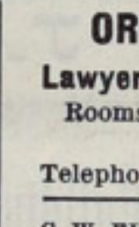

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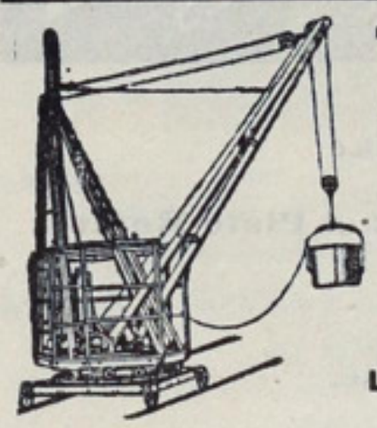

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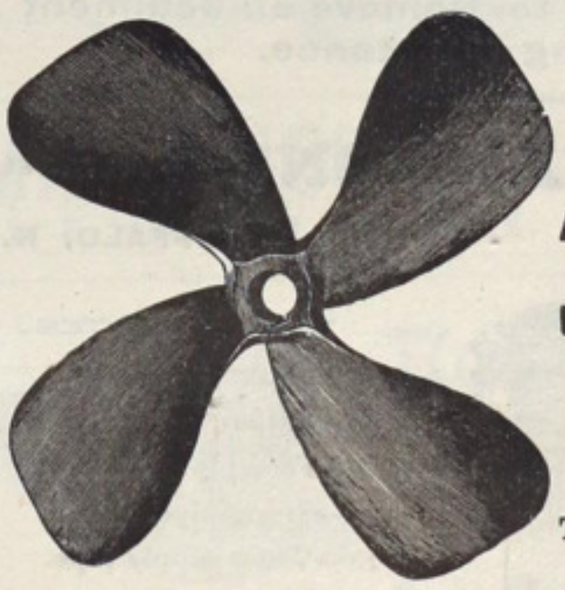

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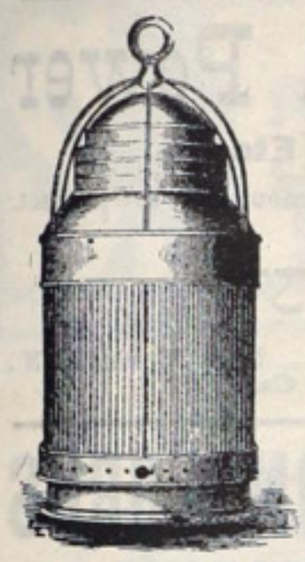

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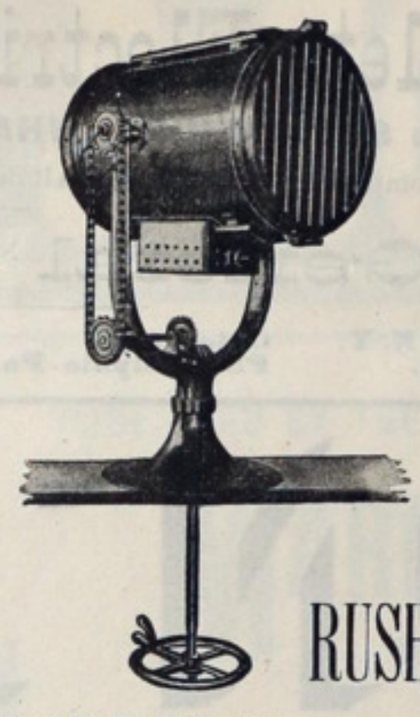

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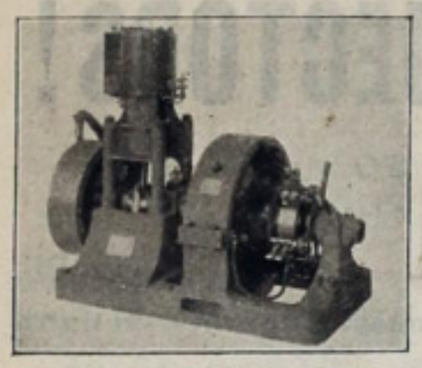

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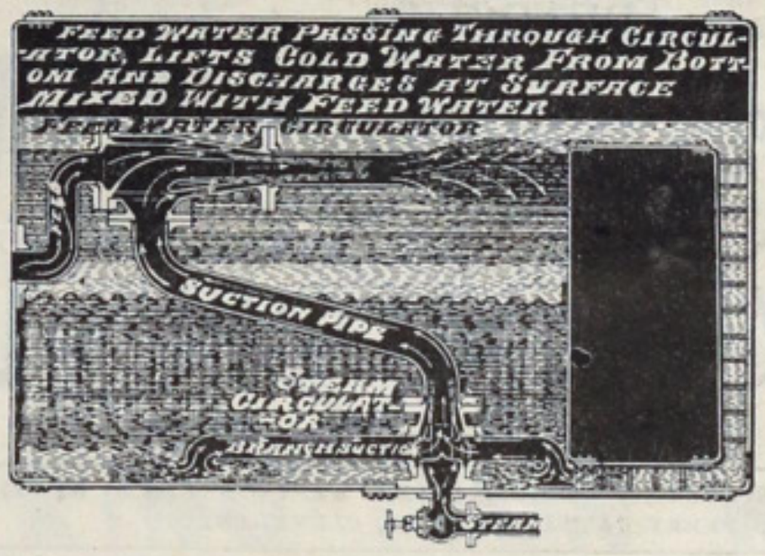
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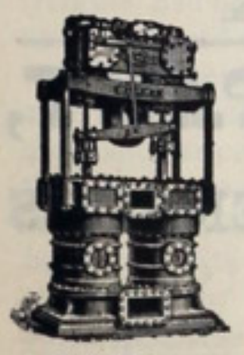

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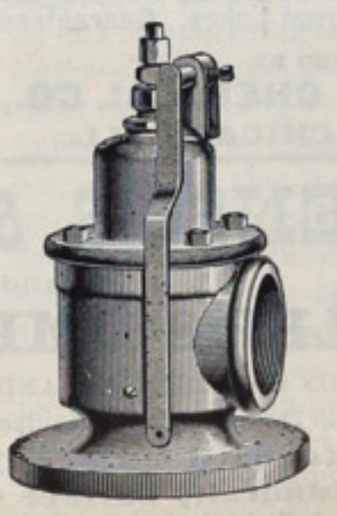

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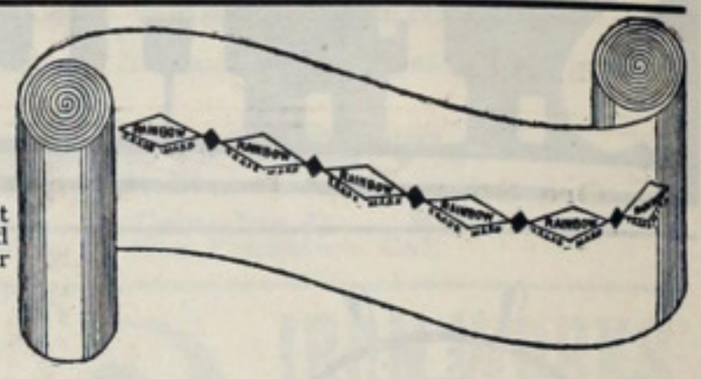

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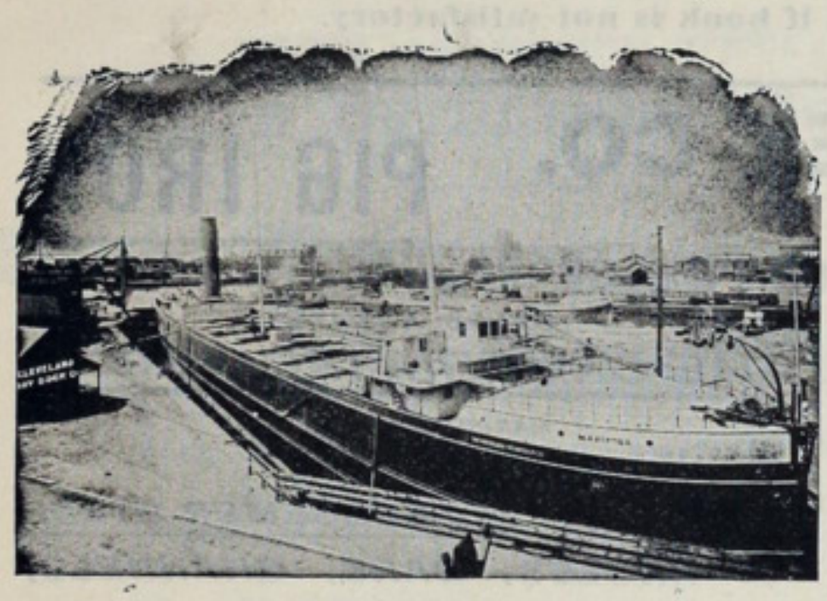

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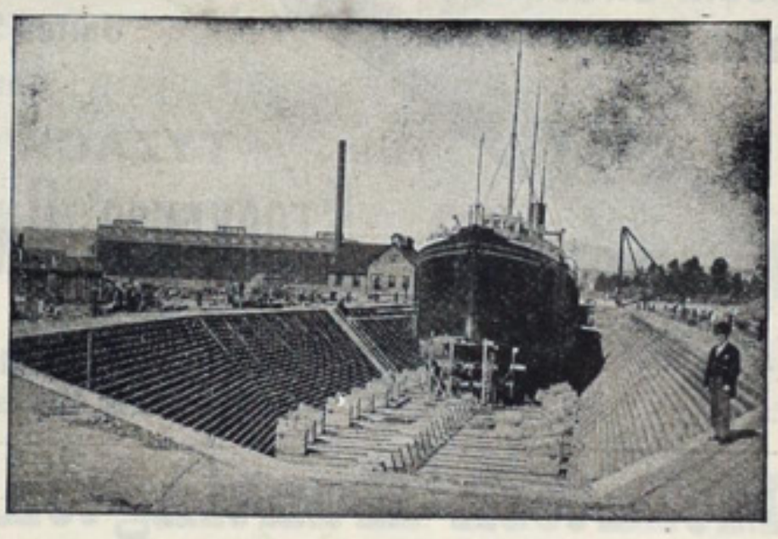

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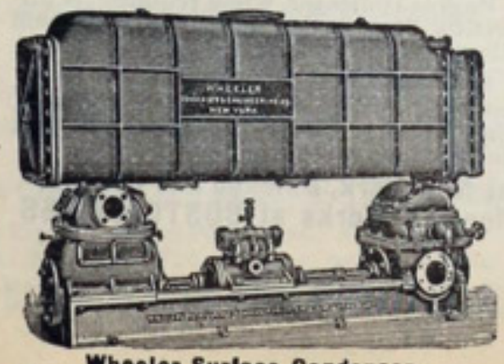

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